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**Improved lightweight aircraft furniture caster assembly.**

The lightweight caster assembly, when used on aircraft food and drink dispensing push carts and other aircraft furniture, in place of conventional caster assemblies, reduces the overall weight of the aircraft furniture, thus resulting in a considerable fuel saving. Moreover, the caster assembly is inexpensive to make and install and is durable. It includes a caster wheel of lightweight metal or plastic and generally inverted U shaped support bracket or yoke. The wheel has transverse cut out portions as well as transverse passageways through which metal or plastic reinforcing rods are inserted. The wheel axle passageway is lined with removable lightweight metal or plastic reinforcing and aligning sleeves. A lightweight metallic braking plate with a notched outer periphery may be releasably secured to one side of the wheel, against which a braking mechanism connected to a push cart can releasably bear to brake and stop the wheel from turning and to lock the wheel in the stationary position. The wheel bracket can be fixedly or swivably mounted to the aircraft furniture.

IMPROVED LIGHTWEIGHT AIRCRAFT  
FURNITURE CASTER ASSEMBLY

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

5       The present invention generally relates to furniture components and, more particularly, to an improved lightweight aircraft furniture caster assembly.

PRIOR ART

Conventional commercial aircraft food and  
10 drink dispensing push carts, storage carts, wheeled chairs and the like bear caster assemblies which are relatively heavy and cumbersome and include steel wheels and brackets and the like. It has been found that such assemblies considerably increase the weight of furniture to which  
15 they are attached, and in most cases have strengths which greatly exceed their real needs. The extra weight of the caster assemblies significantly increases the aircraft load and thus the aircraft fuel requirements and ultimately the costs of operating the aircraft.

20       Commercial airlines are particularly cost conscious because of the high cost of jet fuel and the intense competition between the various airlines for passengers. Passenger preferences in many instances hinge on the relative fare rates and these are ultimately controlled,  
25 in part, by the flight cost, including aircraft fuel consumption.

There is a current need for improved fuel conservations, because of incipient fuel shortages, as

well as requirement of airlines to compete economically for passengers. There consequently is a need for an improved aircraft furniture caster assembly which will reduce aircraft fuel costs substantially. The assembly  
5 should be capable of being provided in various sizes and styles to fit various types of aircraft furniture.

#### SUMMARY OF THE INVENTION

The improved aircraft furniture caster assembly of the present invention comprises a lightweight wheel of  
10 plastic such as glass-reinforced nylon and/or polypropylene or of a lightweight metal such as aluminum or magnesium or a combination thereof. The wheel is releasably rotatably secured in an inverted generally U-shaped support bracket of similar lightweight material.  
15 More generally, it comprises in combination a lightweight aircraft furniture caster wheel consisting essentially of lightweight material, said wheel having transverse cut-away portions to reduce the overall weight of said wheel; and a generally inverted U-shaped lightweight  
20 caster wheel support bracket releasably connected to said wheel for free rotation of said wheel, said bracket consisting essentially of lightweight material.

In one embodiment the wheel has large transverse cut away portions to substantially reduce its weight, and  
25 contains transverse passageways in which reinforcing rods are disposed to increase its load bearing capacity, dimensional stability and overall strength. The rods may be threaded bolts which can also be used to hold a peripherally notched, circular, metallic braking plate  
30 against one side of the wheel. A braking mechanism such as a spring loaded foot pedal actuated arm bearing a friction roller may also be mounted on a push cart to

which the caster assembly is connected, and can be used to slow, stop and lock the wheel.

Reinforcing inserts of metal, low friction plastic or the like may be releasably disposed in the central  
5 transverse axle passageway in the wheel to help align the wheel axle therein, facilitate turning of the wheel and strengthen the wheel. Further features of the improved caster assembly are set forth in the following detailed description and accompanying drawings.

10

## DRAWINGS

Figure 1 is a schematic top plan view of the connector plate portion of a first preferred embodiment of the improved aircraft furniture caster assembly of the present invention;

15

Figure 2 is a schematic side elevation of the caster assembly referred to in Figure 1;

Figure 3 is a schematic front elevation, partly broken away, of the caster assembly shown in Figure 2;

Figure 4a and Figure 4b are, respectively, schematic  
20 side elevations of a wheel axle passageway central sleeve and a peripheral sleeve for the wheel axle passageway;

Figure 5 is an enlarged schematic side elevation of the wheel of the assembly of Figure 2;

Figure 6 is an enlarged section taken along the  
25 section line 6-6 of Figure 5;

Figure 7 is a schematic side elevation, partly broken

away, of a second preferred embodiment of the improved lightweight aircraft furniture caster assembly of the present invention;

Figure 8 is a schematic top plan view of the bracket  
5 of the assembly of Figure 7;

Figure 9 is a schematic front exploded view partly broken away, of the assembly of Figure 7;

Figure 10 is a schematic side elevation of the braking plate of the assembly of Figure 7; and,

10 Figure 11 is a schematic front elevation of the assembly of Figure 7, showing the assembly attached to the underside of an aircraft food and drink dispensing push cart, with a wheel braking mechanism also connected to the cart and releasably bearing against the braking plate of  
15 the caster assembly.

#### DETAILED DESCRIPTION

#### FIGURES 1-6

Now referring more particularly to Figures 1-6 of the accompanying drawings, a first preferred embodiment of the  
20 improved, lightweight aircraft furniture caster assembly is schematically depicted therein. Thus, assembly 20 is shown. It is adaptable for use with all types of aircraft furniture and other furniture, including push carts, storage carts, and wheeled beds, chairs and tables, as  
25 well as other furniture items and the like.

Assembly 20 comprises a wheel 22, which is fabricated of lightweight material preferably selected from the group

consisting of aluminum, magnesium, plastic, glass and mixtures thereof. In one preferred embodiment, the outer rim 24 of wheel 22 is formed of glass fiber reinforced nylon while the central core 26 thereof which is bonded thereto may be of, for example, polypropylene, polystyrene or the like. If desired, wheel 22 could be fabricated of the same material throughout.

Wheel 22 is of substantial width and is releasably secured, as by a bolt 28 and nut 30 to a generally inverted U shaped bracket or yoke 32, in turn secured at the upper end thereof to a flat mounting plate 34 by swivel securing means which may be in the form of a depending sleeve 36 received in an opening 38 in plate 34 and attached to bracket 32. Sleeve 36 has a vertical swivel arm receiving opening therein so that bracket 32 is supported below and turns freely below plate 34 on such an arm while plate 34 can be fixedly secured to the underside of aircraft furniture (not shown) as by screws (not shown) in vertical openings 42 therein.

It will be noted that bracket 32 includes a top horizontal portion 44 and a pair of spaced parallel depending legs 46 which may be angled (Figure 2). Bracket 32 and plate 34, as well as bolt 28, nut 30 and sleeve 36, can be of strong material, such as plastic, glass or a light metal such as aluminum, magnesium or the like or a composite thereof.

Bolt 28 acts as an axle and horizontally passes through openings (not shown) in the lower ends of legs 46 and through a horizontal axle passageway 48 in wheel 22. Passageway 48 is dumbbell shaped with a small diameter central portion 50 and larger diameter lateral portions 52. A sleeve 54 (Figure 4a) is releasably disposed in

portion 50 and a pair of sleeves 56 (Figure 4b) are releasably disposed in portions 52. Sleeves 54 and 56 preferably are of lightweight metal such as aluminum or magnesium and/or of slippery plastic material such as 5 polytetrafluoroethylene, to act as a guideway for axis bolt 28 and to help strengthen wheel 22 while promoting free turning of wheel 22 relative to axle bolt 28.

It will be noted from Figures 2, 5 and 6 that wheel 22 has four symmetrically disposed openings 58 extending 0 transversely therethrough to reduce its weight substantially and has 4 smaller transverse openings 60 extending therethrough in which lightweight reinforcing rods 62, preferably of aluminum and magnesium comprising bolts 64 with nuts 66, are secured to dimensionally 15 stabilize and strengthen wheel 22. Accordingly, wheel 22 is both strong and light, utilizing a minimum of material strategically placed. Assembly 20 substantially reduces aircraft flight fuel costs and is inexpensive to make, easy to install, durable and effective.

## 20 FIGURES 7-11

A second preferred embodiment of the improved lightweight aircraft furniture caster assembly of the present invention is schematically depicted in Figures 7 11. Thus, assembly 20a is shown. Components thereof 25 similar to those of assembly 20 bear the same numerals, but are succeeded by the letter "a". Assembly 20a is substantially identical to assembly 20, except that assembly 20a is of the fixed caster type, rather than the swivel caster type. In this regard, swiveling means are 30 omitted and bracket 32a includes in its top portion 44a holes 42a through which screws (not shown) can be placed to mount bracket 32a to the underside of aircraft

furniture, such as push cart 70 (Figure 11). Moreover, spaced vertical depending legs 46a are not angled.

Wheel 22a is similar to wheel 32, as are its components, including bolt 28a, nut 30a, bolts 64a and  
5 nuts 66a, sleeve 54a and sleeves 56a, and passageway 48a. Moreover, a flat circular braking plate 72 having a notched outer periphery 74 is releasably secured to one side of wheel 22 by bolts 64a received through openings 76 in plate 72. Plate 72 is also provided with a central  
10 opening 78 matching that of wheel 22a.

Figure 11 schematically depicts assembly 20a installed on the underside of push cart 70 and with one type of a conventional cart braking mechanism 80 also installed on the underside of cart 70. Mechanism 80 is  
15 designed to releasably bear against plate 72 to slow the rotation of wheel 22a, stop such rotation and lock wheel 22a in the stopped position. For example, mechanism 80 may include a foot operated pedal 82 connected to an arm 84 biased forward by spring 86 and hinged to a support 88.

20 Movement of arm 84 rearward by pedal 82 against the spring bias causes arm 84 to act upon one arm 90 of a generally inverted U-shaped member 92 held in a channeled bracket 94 attached to the underside of cart 70 and, via a motion translation component 96 connected to arm 84 and  
25 member 92, to tilt member 92 such that the other arm 98 of member 92 moves toward plate 72, forcing a rubber ball or roller 100 connected thereto against plate 72 to frictionally engage it and slow, then stop the rotation of wheel 22a. Ball 100 may be dimensioned to fit into a  
30 notch 74 of plate 72 so as to lock plate 72 in the stopped position until foot pedal 82 is released and spring 86 biases arm 80 forward, causing arm 98 and ball 100 to



pivot away from plate 72.

It will be understood that any other suitable braking arrangement utilizing braking plate 72 can be employed in place of that described above. In any event, assembly 20a  
5 is light in weight durable, efficient and compact. The caster assembly of the present invention can be used with furniture other than aircraft furniture, if desired.

Various other modifications, changes, alterations and additions can be made in the improved lightweight aircraft  
10 furniture caster assembly of the present invention, its components and their parameters. All such modifications, changes, alterations and additions as are within the scope of the appended claims form part of the present invention.

## WHAT IS CLAIMED IS:

1. An improved lightweight aircraft furniture caster assembly, said assembly comprising, in combination:

- a) a lightweight aircraft furniture caster wheel  
5 consisting essentially of lightweight material, said wheel having transverse cut away portions to reduce the overall weight of said wheel; and,
- b) a generally inverted U shaped lightweight caster wheel support bracket releasably connected to said wheel for  
10 free rotation of said wheel, said bracket consisting essentially of lightweight material.

2. The improved lightweight aircraft furniture caster assembly of Claim 1 wherein said wheel includes a plurality of spaced passageways symmetrically disposed  
15 around the central hub of said wheel, and extending transversely through said wheel, said passageways having reinforcing rods releasably secured therein to improve the strength weight bearing capacity and dimensional stability of said wheel.

20 3. The improved lightweight aircraft furniture caster assembly of Claim 2 wherein said wheel hub has a transverse axle passageway therethrough and wherein said axle passageway is lined with removable reinforcing sleeve inserts.

25 4. The improved lightweight aircraft furniture caster assembly of Claim 3 wherein said axle passageway is generally dumbbell shaped, the lateral portions thereof being of greater diameter than the medial portion thereof,

and wherein two of said inserts are dimensioned to rest in said lateral portions of said axle passageway and to act as strength-reinforcing axle guides.

5        5.     The improved lightweight aircraft furniture  
caster assembly of Claims 3 or 4 wherein said reinforcing  
rods and said sleeves are metallic and wherein said wheel  
and bracket comprise material selected from the group  
consisting of aluminum, magnesium, plastic, glass and  
mixtures thereof.

10       6.     The improved lightweight aircraft furniture  
caster assembly of Claim 5 wherein said wheel comprises an  
outer rim of glass-reinforced nylon connected to a central  
core portion comprising polyurethane.

15       7.     The improved lightweight aircraft furniture  
caster assembly of any of the preceding claims wherein  
said assembly includes swivel means for swivably  
connecting said bracket to aircraft furniture.

20       8.     The improved lightweight aircraft caster assembly  
of any one of the preceding claims wherein said assembly  
includes a lightweight braking plate releasably connected  
to one side thereof against which furniture braking means  
can bear.

25       9.     The improved lightweight aircraft furniture  
caster assembly of Claim 8 wherein said braking plate is  
metallic and generally circular and includes notches at  
the outer periphery thereof adapted to positively engage  
furniture braking means.

10.     The improved lightweight aircraft furniture  
caster assembly of Claim 9 wherein said bracket is adapted

to be fixedly secured to the underside of an aircraft food and drink-dispensing push cart.

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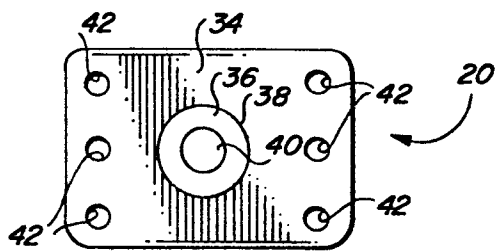


FIG. 1

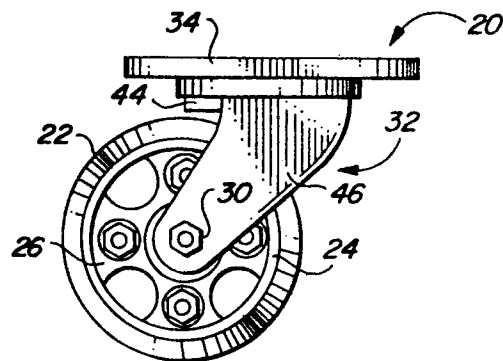


FIG. 2

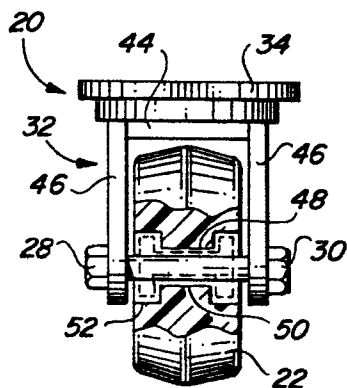
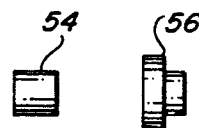


FIG. 3



(a) (b)

FIG. 4

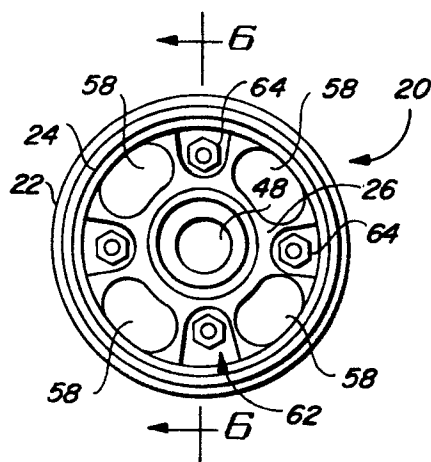


FIG. 5

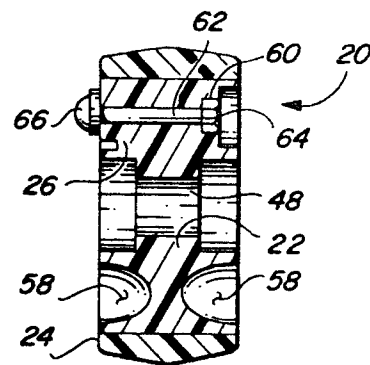


FIG. 6

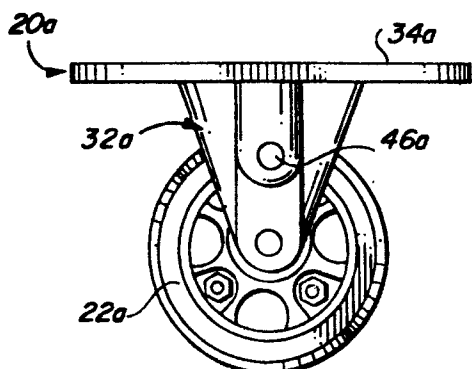


FIG. 7

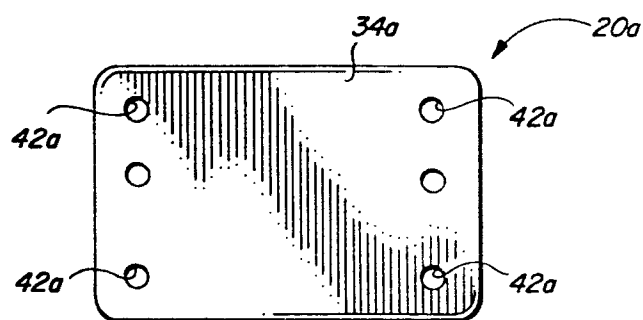


FIG. 8

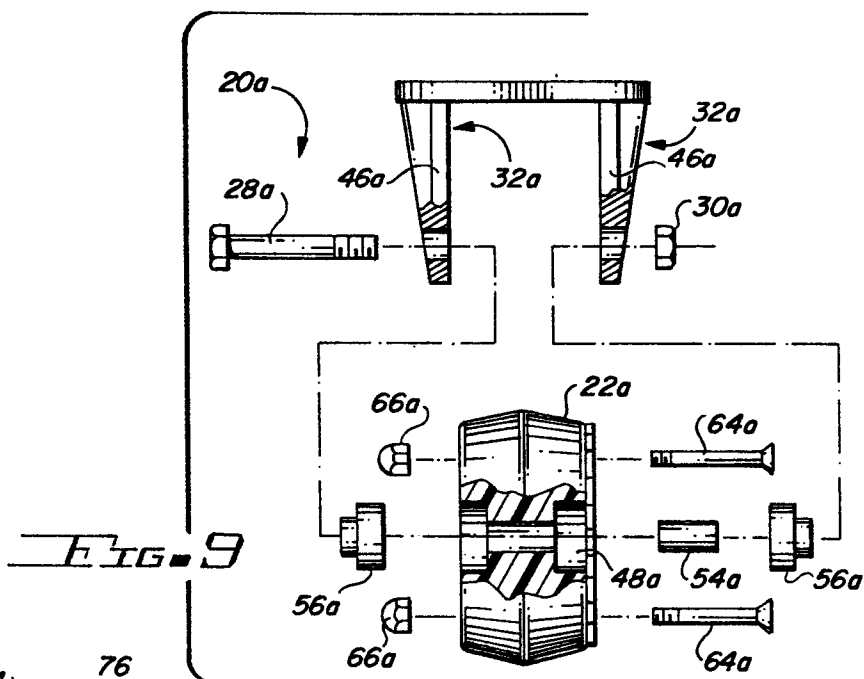


FIG. 9

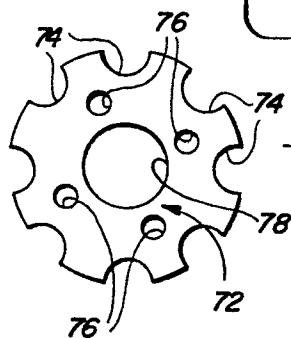


FIG. 10

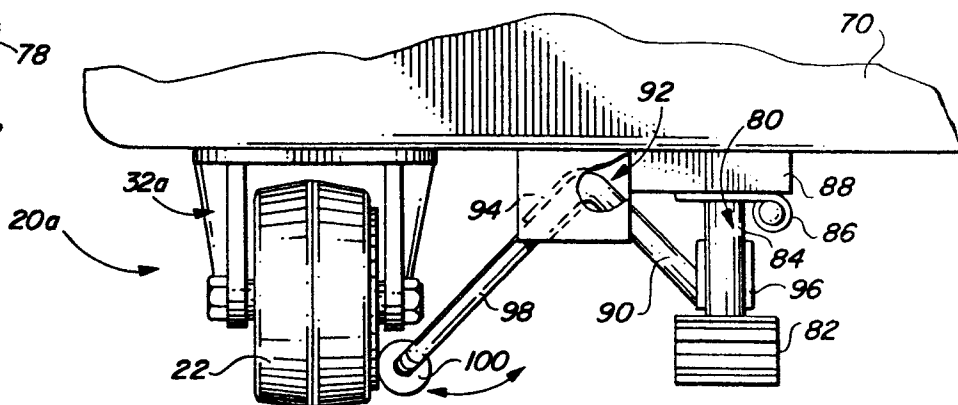


FIG. 11